Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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In the Matter of	)	
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Wireless Telecommunications Bureau Reminds Paging and Radiotelephone Service Licensees of Certain Technical Rules and Seeks Comment on the need for Technical Flexibility	)	WT Docket 14-180

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COMMENTS OF THE TETRA AND CRITICAL COMMUNICATIONSASSOCIATION ON THE NEED FOR FLEXIBILITY IN THE PART 22 RULES.

On October 17th, 2014, the Federal Communications Commission ("FCC") issued a Notice [1]reminding licensees of certain rules that must be complied with for Part 22 Paging and Radiotelephone Service Licences and solicited comments on whether it would appropriate to update these rules in order to allow some flexibility such that other technologies could be used in these channels resulting in more intensive use of them and thereby a national benefit for users. One of the examples given was the Report and Order modifying the Part 90 Rules to permit TETRA technology to be used in two bands, the 450-470 MHz portion of the UHF band (421-512 MHz), and Business/Industrial Land Transportation 800 MHz band channels (809-824/854-869 MHz) that are not in the National Public Safety Planning Advisory Committee (NPSPAC) portion of the band.

As a long term industry subject matter expert and industry consultant that provides services to Public Safety (pro Bono services to Region 10 frequency coordinator) and Entreprise users of LMR technology welcomes the opportunity to comment on this idea and believes that there is a demand from users for TETRA in Part 22 channels and that the small changes that would need to be made to the Rules would still mean that there was adequate interference protection for existing users on the channels.

DISCUSSION

The two rules that TETRA needed modifying for Part 90 were the channel bandwidth and the emission requirement. It is the same for Part 22 and the arguments for why the requirements can be relaxed are the same.

Channel Bandwidth

Typically TETRA channel bandwidth is 22 kHz compared to the 20 kHz in Part 22. This increase

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[1] Wireless Telecommunications Bureau Reminds Paging and Radiotelephone Service Licensees of Certain Technical Rules and Seeks Comment on the Need for Technical Flexibility. WT Docket 14-180

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does not necessarily degrade interference protection due to the difference in tolerances between the ETSI standard[2] and Part 22[3]. Although TETRA would require an update to the Part 22 rules to allow the channel bandwidth to be 22kHz it is very relevant to consider the frequency stability impact on maintaining the transmission signal within its assigned channel and without interference on adjacent channels for all temperatures and voltages in the equipment working ranges. In fact the effective occupied bandwidth (taking into consideration the authorized shifts of carrier frequency due to temperature and voltage specifications under the FCC rules) is higher for the current specified limit (20 kHz) than that needed for TETRA (22 kHz) when taking account of the TETRA frequency stability. This is reflected as follows:

Data for $F_{carrier}$=470 MHz down to 138MHz

$BW_{occupied}$ WITHOUT authorized frequency shift		$BW_{occupied}$ WITH authorized frequency shift (±5ppm)
Current FCC Limits	20 kHz	24.7 kHz
New FCC Limits with TETRA frequency stability	22 kHz	22.2 kHz

The proposed occupancy is actually less than that already accepted when shifts due to voltage and temperatures are taken into account.

Out of Band Emissions

The Part 22 rules require that "The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB."4. TETRA does not meet this requirement just at the edge of the channel due to the increased occupied bandwidth but is well below this limit elsewhere. The Association in its original application for a waiver 5 to the Part 90 Rules provided an analysis that showed that the gain in integrated power at the edge of occupied bandwidth was more than compensated by reductions elsewhere. The modelling was supported by practical observations on performance by Bay

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[2] - Base stations (BS) by ETSI EN 300 392-2 V3.4. 1 Section 7.7
- For Mobile (MS) :
  - WITH Automatic Frequency Control (AFC) – Lock onto BS by ETSI EN 300 392-2 V3.4.1 Section 7.8
  - WITHOUT Automatic Frequency Control (AFC) – Do not lock onto BS by ETSI EN 300 396-2 V3.4.1 Section 7.4
  - WITHOUT Automatic Frequency Control (AFC) – Do not lock onto BS by ETSI EN 300 396-2 V3.4.1 Section 7.4

and also extended down to 138MHz in TR 102 300-2

[3] 47 CFR §22.355

4 47 CFR §22.359

5 *In the Matter of Request by the TETRA Association for Waiver of Sections 90.209, 90.210 and 2.1043 of the Commission's Rules*, Request for Waiver of Sections 90.209, 90.210 and 2.1043, ET Docket No. 09-234 (filed Nov. 20, 2009) ("Waiver Request").

Electronics and Wireless Engineering Systems and Technology 6. FCC were persuaded that coupled with the Adjacent Channel Power specifications that TETRA terminals have to meet under the ETSI specification 8 there was adequate protection for interference into other channels.

0.2 TETRA In order to meet the Part 22 Rules as they stand a number of manufacturers have modified the occupancy and emissions performance of their TETRA products by sharpening the modulation filter. This is a RCC filter which is specified in ETSI to have the coefficient α=0.357. If this value is changed to 0.2 the Part 22 channel occupancy and emissions requirements can be met.

The Association would ideally like the rules to be modified as they have been for Part 90 but in the interim, it would like to see products using the 0.2 TETRA approach continue to be approved for Part 22 as they meet the existing requirements.

Advantages of TETRA for Part 22 Users

There is already demand for TETRA from Part 22 users. Some of the reasons they wish to use TETRA are:-

- Its efficient use of spectrum – the four slot TDMA technology used gives the equivalent to four 6.25 kHz channels in the occupied bandwidth
- The multi vendor environment supported by the Associations comprehensive interoperability testing and certification process that ensures users can mix and matches suppliers to achieve the best cost and technical solution for their communications needs.
- The rich set of features offered by TETRA including the ability to support workflow and simple form filling through SDS messaging
- The availability of repeaters and gateways to extend coverage
- The availability of GPS information to time and location stamp data as well as to assist dispatchers to resource manage efficiently
- The wide range of products offered such as those with man-down and lone worker facilities, those approved for use in hazardous environments and a huge variety of accessories that meet the diverse needs of industrial and utility users

CONCLUSION

There are a large number of consulting professionals and end users that believes it would be beneficial to continue to allow TETRA to be available to Part 22 users through the use of 0.2 TETRA. It does not believe this needs any change to the Rules.

There are two TETRA networks in the State of Georgia that are used by Power Utility companies to serve and protect the grid with voice and data services. Harris County Public Safety agencies are using the TETRA technology to serve and protect property and lives. Clearly the technology is spectrally efficient in providing voice and data services like the Public Safety networks utilized in the rest of the world. TETRA technology is the most widely used technology by Public Safey worldwide. TETRA is the most interoperable technology offered in the market with a third party overseeing the certification process, not only for the interoperability of features and functions but all protocol layers as well.

It would like the band occupancy rule to be changed to 22 kHz for TETRA and for the out of band emissions to be changed in the same way as they have for Part 90 which is, "TETRA ACP limit for emissions close to the carrier (up to 75 kHz offset) may be authorized, and for offset frequencies greater than 75 kHz the default Part 90 emission limit of 43 + 10 log (P) should apply." It believes that such change will give adequate protection to other Part 22 users.

Respectfully Submitted
Steve Macke dba Advent C3

December 8, 2014

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6 Comments of Wireless Engineering Systems and Technology (WEST), ET Docket No. 09-234 (filed Jan. 28, 2010) ("WEST Comments").

7 ETSI EN 300 392 v 3.4.1 Section 5.5 "...Where(is the roll-off factor, which determines the width of the transmission band at a given symbol rate. The value of α shall be 0,35."